

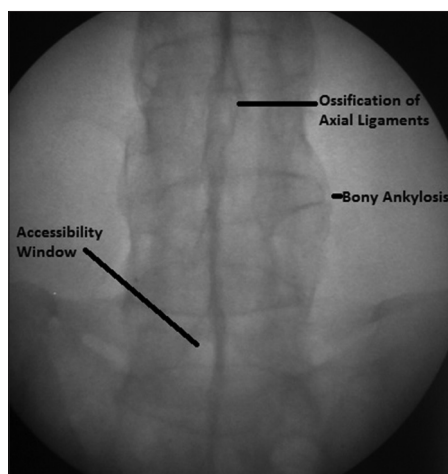
# Fluoroscopic-guided paramedian approach to subarachnoid block in patients with ankylosing spondylitis: A case series

## INTRODUCTION

The airway and axial skeleton involvement in ankylosing spondylitis (AS) poses unique challenges to the anaesthesiologists.<sup>[1]</sup> The spinal manifestations comprise of spondylitis, diskitis, arthritis and enthesitis. These lead to progressive stiffness, ossification of the axial ligaments [Figure 1], obliteration of the intervertebral spaces and syndesmophytes formation; hindering access to the central neuraxial space.<sup>[2]</sup> Fluoroscopy may aid in identifying the small 'accessibility window' [Figure 1]; thereby facilitating subarachnoid block (SAB) in those inaccessible by the landmark technique. However, few anatomical and technical considerations apply. This case series describes the author's novel technique of fluoroscopic guided paramedian approach to SAB (FPAS) and their experience with the same in six AS patients with severe lumbar spine (LS) involvement.

## CASE REPORT

The authors were involved in the perioperative management of ten cases of AS posted for various elective surgeries over the past 2 years. SAB was employed as the anaesthetic technique of choice in six patients [Table 1]. All the patients had longstanding AS

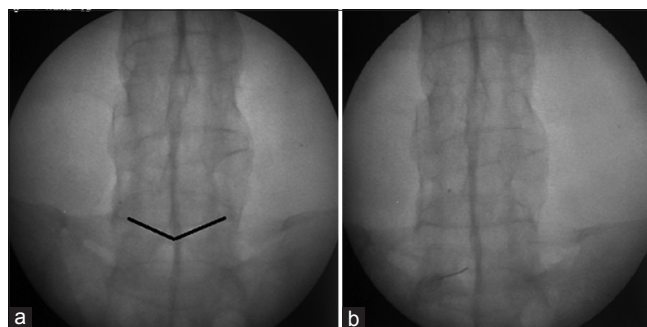


**Figure 1:** Lumbar spine involvement in a patient with ankylosing spondylitis

with involvement of the cervical spine, an anticipated difficult airway [Table 1] and severe LS involvement with variable degree of bony ankylosis, reduction of the intervertebral spaces, straightening of the lumbar lordosis, ossification of the axial ligaments, scoliosis and limitation of the spinal movements [Figure 1]. This contributed to both difficult positioning and accessibility for SAB seemingly impossible by the landmark technique. Successful SAB was achieved in the operation theatre in all the six patients by the FPAS technique consisting of (1) positioning the patient in prone (preferable) or lateral position; (2) obtaining an anteroposterior (AP) image of the lumbosacral spine [Figure 1]. It helps in identifying the vertebral levels, severity of LS involvement and the intervertebral space of interest i.e. widest space below L2 [L5-S1 space in Figure 1] and (3) obtaining a true AP view of the LS Spine (spinous process equidistant from both the pedicles and squaring of the vertebral endplates) by variable degrees of lateral and oblique C-arm rotation. Scoliosis or other anomalies may make images difficult to interpret. A true AP view not only makes image more apprehensible but also further open the intervertebral space of interest [L5-S1 space in Figure 2a]; (4) maintaining proper asepsis and local anaesthesia of the needle puncture site and tract; (5) placing a radio-opaque marker over the right or left paramedian interlaminar space and (6) inserting the needle [Figure 2b] and confirmation of the subarachnoid space by the free flow and positive aspiration of cerebrospinal fluid (CSF).

## DISCUSSION

We employed the FPAS technique in six patients undergoing infra-umbilical or lower limb surgeries of intermediate duration. SAB has its unique advantages of maintenance of an awake state, avoidance of airway manipulation, reduced blood loss, early



**Figure 2:** (a): True anteroposterior fluoroscopic image at the intervertebral level of interest (L5-S1); (b) accessing the subarachnoid space

**Table 1: Demographic and clinical characteristics**

Characteristic	Value
Age, years (mean±SD)	39.2±7.74
Male:female	4:2
Weight, kg (mean±SD)	58.4±7.91
Height, cm (mean±SD)	156.6±8.1
Time since diagnosis, years (mean±SD)	17.4±4.24
Surgery (n=6)	
Debridement of diabetic foot	1
Below knee amputation	1
Release of post-burn contracture (leg) and SSG	1
Haemorrhoidectomy	2
Vaginal hysterectomy	1
Mean duration of surgeries under SAB, min (mean±SD)	60±19.36
Interlaminar space in which SAB performed (n)	
L3–L4	2
L4–L5	1
L5–S1	3
Cervical spine movements (n)	
Reduced	1
Absent	5
Reduced mouth opening (n)	4
Modified Mallampati grade (n)	
II	2
III	2
IV	2

SD – Standard deviation; SAB – Subarachnoid block; SSG – Split skin grafting

mobilisation, post-operative analgesia and reduced risk of post-operative complications in such patients. The airway and pulmonary involvement make general anaesthesia particularly hazardous in patients with AS.<sup>[3]</sup> The progressive involvement of the cervical spine with reduced to absent neck movements, flexion deformities and ankylosis of the temporomandibular joints with reduced mouth opening; makes airway accessibility difficult in AS.<sup>[1,4]</sup> Therefore, it becomes imperative to determine the dose and volume of local anaesthetic administered during SAB. The clinical judgement, expert opinion and the limited evidence available justify the use of SAB in infra-umbilical extraperitoneal, perineal and lower limb surgeries.<sup>[5]</sup> A high level of motor block with the associated risk of respiratory and cardiovascular may require securing the airway in an emergency which may be catastrophic in a patient with the anticipated difficult airway.<sup>[5]</sup>

Landmark-guided SAB (both midline and paramedian approach) may be technically difficult or even impossible in patients with AS.<sup>[5,6]</sup> The literature evaluating the utility of image-guidance for SAB in AS is scant; limited only to individual case reports.<sup>[6,7]</sup> Fluoroscopy guided transforaminal approach has been reported to facilitate SAB in a patient with AS.<sup>[7]</sup> However,

the transforaminal approach may be associated with higher incidence of encountering the exiting spinal nerve root, inducing distressing paraesthesia and nerve root injury.<sup>[8]</sup> The paramedian approach avoids the ossified midline ligaments [Figure 1] and has a lower risk of encountering the exiting spinal nerve root. None of our patients complained any paraesthesia during the procedure or post-dural puncture headache. Lumbar puncture was performed in prone position in all the six patients. The pillows are usually positioned under the abdomen to straighten the lumbar lordosis and open up the intervertebral spaces in patients for neuraxial procedures in prone position. We did not use pillows under the abdomen in any of the patients as straightening of the lumbar lordosis, usually observed in these patients obviated the need for the same. Successful SAB was achieved in the first attempt in all the six patients. The passive backflow of CSF was observed to be particularly slow in all the patients. Experimental and clinical studies have suggested a lower CSF pressure in the prone position.<sup>[9,10]</sup> The lower incidence of post-dural puncture headache observed after surgeries in prone position has also been hypothesised to a lower CSF pressure and lesser CSF leak in the prone position.<sup>[9]</sup> A comparison of CSF opening pressure in patients undergoing fluoroscopic-guided lumbar puncture in prone versus lateral position, found the mean pressure to be 1.2 cm H<sub>2</sub>O lower in the prone position; however, the results failed to reach statistical significance.<sup>[10]</sup> It is therefore prudent to wait for the passive return of CSF after perceiving the loss of resistance to avoid unnecessary deeper advancement of the needle. The radiation exposure and associated biological side-effects to the patient and the staff remain another concern with the FPAS. This can be minimised, although not completely eliminated by judicious patient selection; applying the principles of time (reducing the exposure time), distance (radiation exposure is inversely proportional to square of distance from the radiation source), proper shielding and 'as low (radiation exposure) as reasonably achievable (ALARA)'. Use of low dose and pulse mode helps in reducing radiation exposure to both the patient and staff during FPAS.

## CONCLUSION

FPAS is a novel technique which facilitates SAB access in AS patients with severe LS involvement, avoids the trauma of repeated attempts and general anaesthesia in patients with seemingly impossible SAB by the landmark technique.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**Mayank Gupta, Priyanka Gupta**

Department of Anaesthesia, ICU and Pain, Shri Mahant Indresh Hospital, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India

**Address for correspondence:**

Dr. Mayank Gupta,  
Department of Anaesthesia, ICU and Pain, Shri Mahant Indresh Hospital, Shri Guru Ram Rai Institute of Medical and Health Sciences, Flat No 9, G Block, College Campus, Dehradun - 248 001, Uttarakhand, India.  
E-mail: drm\_gupta@yahoo.co.in

**REFERENCES**

- Oliveira CR. Ankylosing spondylitis and anesthesia. *Rev Bras Anesthesiol* 2007;57:214-22.
- Hermann KG, Althoff CE, Schneider U, Zühlendorf S, Lembcke A, Hamm B, *et al.* Spinal changes in patients with spondyloarthritis: Comparison of MR imaging and radiographic appearances. *Radiographics* 2005;25:559-69.
- Woodward LJ, Kam PC. Ankylosing spondylitis: Recent developments and anaesthetic implications. *Anaesthesia* 2009;64:540-8.
- Dave N, Sharma RK. Temporomandibular joint ankylosis in a case of ankylosing spondylitis-anaesthetic management. *Indian J Anaesth* 2004;48:54-6.
- Schelew BL, Vaghadia H. Ankylosing spondylitis and neuroaxial anaesthesia-a 10 year review. *Can J Anaesth* 1996;43:65-8.
- Goyal R, Singh S, Shukla RN, Singhal A. Management of a case of ankylosing spondylitis for total hip replacement surgery with the use of ultrasound-assisted central neuraxial blockade. *Indian J Anaesth* 2013;57:69-71.
- Channabasappa SM, Dharmappa S, Pandurangi R. Fluoroscopy guided transforaminal epidural anesthesia in ankylosing spondylitis. *Saudi J Anaesth* 2016;10:101-3.
- Neal JM, Bernards CM, Hadzic A, Hebl JR, Hogan QH, Horlocker TT, *et al.* ASRA practice advisory on neurologic complications in regional anesthesia and pain medicine. *Reg Anesth Pain Med* 2008;33:404-15.
- Dogan M, Turker H, Ugurlu M, Ergun F, Bozkurt M. Do peroperative supine and prone positions have an effect on postspinal headache incidence? *Neurosciences (Riyadh)* 2005;10:64-7.
- Abel AS, Brace JR, McKinney AM, Friedman DI, Smith SD, Westesson PL, *et al.* Effect of patient positioning on cerebrospinal fluid opening pressure. *J Neuroophthalmol* 2014;34:218-22.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

**Access this article online****Quick response code**

Website:  
www.ijaweb.org

DOI:  
10.4103/ija.IJA\_655\_17

**How to cite this article:** Gupta M, Gupta P. Fluoroscopic-guided paramedian approach to subarachnoid block in patients with ankylosing spondylitis: A case series. *Indian J Anaesth* 2018;62:142-4.

© 2018 Indian Journal of Anaesthesia | Published by Wolters Kluwer - Medknow

**Author Help: Reference checking facility**

The manuscript system (www.journalonweb.com) allows the authors to check and verify the accuracy and style of references. The tool checks the references with PubMed as per a predefined style. Authors are encouraged to use this facility, before submitting articles to the journal.

- The style as well as bibliographic elements should be 100% accurate, to help get the references verified from the system. Even a single spelling error or addition of issue number/month of publication will lead to an error when verifying the reference.
- Example of a correct style  
Sheahan P, O'leary G, Lee G, Fitzgibbon J. Cystic cervical metastases: Incidence and diagnosis using fine needle aspiration biopsy. *Otolaryngol Head Neck Surg* 2002;127:294-8.
- Only the references from journals indexed in PubMed will be checked.
- Enter each reference in new line, without a serial number.
- Add up to a maximum of 15 references at a time.
- If the reference is correct for its bibliographic elements and punctuations, it will be shown as CORRECT and a link to the correct article in PubMed will be given.
- If any of the bibliographic elements are missing, incorrect or extra (such as issue number), it will be shown as INCORRECT and link to possible articles in PubMed will be given.